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## UNSOLVED PROBLEMS.

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**NOTE.** The following problems still remain unsolved (in our columns):

**Average and Probability, 167.** Proposed by R. D. CARMICHAEL, Hartselle, Ala.

A line  $l$  is divided into  $n$  segments by  $n-1$  points taken at random on it; find the mean value of the product of  $p$  of the segments, the  $p$  segments being taken at random and  $p$  being less than  $n$ .

**Geometry, 246.** Proposed by T. L. CROYES, Paris, France.

Given a movable point  $O$  on a fixed diameter of a circle  $S$ , an inscribed triangle  $ABC$ , and the perpendiculars  $OM$ ,  $ON$ ,  $OP$  from the point  $O$  on the sides  $AB$ ,  $AC$ ,  $BC$ . Prove, by pure geometry, that the circle circumscribing the triangle  $MNP$  will always pass through a fixed point.

**Group Theory, 8.** Proposed by L. E. DICKSON, Ph. D., The University of Chicago.

In a chess tournament between eight players, there are seven rounds, the eight players being paired in each round, every pair to be matched once and but once in the tournament. List the possible programs different except as to notation, *i. e.*, not transformable into each other by a substitution on eight letters. Give the number of conjugate programs of each representative retained.

**Mechanics, 181.** Proposed by F. ANDEREGG, Professor of Mathematics, Oberlin College, Oberlin, Ohio.

A triangle  $AOB$ , of which the sides,  $OA$ ,  $AB$ , and the angle at  $O$  are  $a$ ,  $b$ , and  $\alpha$ , revolves uniformly about  $O$ , so that  $OA$  makes the angle  $nt$  with the axis of  $x$ , and carries a circle of which  $AB$  is the diameter. Prove that a point moving in the circumference of the carried circle with twice the angular velocity of the triangle will describe an ellipse whose axes are

$$\sqrt{(a^2 + b^2 + 2ab \cos \alpha)} \pm \sqrt{(a^2 + b^2 - 2ab \cos \alpha)}.$$

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## NOTES.

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Dr. O. L. Underhill has been appointed instructor in mathematics at Princeton University.

Mr. A. D. Pitcher has been appointed fellow in mathematics at the University of Kansas.

Mr. D. A. Lehman has been appointed instructor in mathematics at the University of Wisconsin.

Mr. R. F. Sharpe, assistant in mathematics at Cornell University, is Second Wrangler in mathematics at Cambridge, England.

Dr. Oswald Veblen and Dr. J. W. Young have been appointed to assistant professorships in mathematics at Princeton University.